APPENDIX A

A Self-Reporting Tool to Collect Individual Data for Respiratory Health Effects and Military Airborne Exposures

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Although self-reported data has its limitations, questionnaires or survey tools are incorporated into many aspects of public health research, clinical settings, and medical registries. Several of the initiatives described in previous chapters of this book have made use of some form of a questionnaire. Whereas different applications (eg, research vs clinical) may require different questions, there is often overlap of certain topics. The concept of a single standardized set of questions for US Department of Defense (DoD) and US Department of Veterans Affairs (VA) users to draw upon has been recommended by various entities.[1–4]

PURPOSE

This appendix describes the basis for the set of standardized questions provided in Appendix B (Respiratory Health and Exposure Questionnaire). These questions could be used to collect more consistent and detailed information from individual service members or veterans regarding their deployment exposure experiences and health conditions or symptoms that might be associated with respiratory illness. Questions regarding history of smoking, physical fitness, work activities, and hobbies are also included to help evaluate the influence of potentially critical confounding risk factors. Information obtained through use of these questions could substantially enhance future evaluation of the relationship between deployment exposures and respiratory health. Specific questions provided in this appendix are proposed as the initial start to a larger "standardized reference library" of exposure and health-related questions that could be used by various DoD and VA researchers, clinicians, and public health experts. The questions may be used in their entirety (eg, as the full set provided) or in part (only selected questions), depending on the user's application, an individual's (eg, patient's) experiences and concerns, and/or the time available.

BACKGROUND: A TWO-STAGE EFFORT

The questions in this appendix resulted from combining two separate, but related, questionnaires that evolved from a US Army Public Health Command (USAPHC; Aberdeen Proving Ground, MD) project initiated in 2010.[5] These questionnaires helped to improve two areas of variability that have contributed to the limitations of studies completed thus far regarding postdeployment respiratory health: (1) exposure variability and (2) diagnostic variability. The studies to date evaluate

population health with limited sensitivity to individual health, exposures, and risks factors. Because the health outcomes of concern are not clearly evident at the broadest population levels, attempts to minimize individual variability are warranted.

The project started with the Deployment Airborne Respiratory Exposure (DARE) questionnaire. The DARE questionnaire was designed as a tool to help obtain individual exposure information about potentially hazardous constituents in the air that personnel may have inhaled during their deployment(s). Because exposure history is such a critical component in evaluating environmental associations to health outcomes, the DARE questionnaire was designed to illicit responses that could be used to represent individual service member exposure variability. Specifically, questions regarding the frequency, duration, and intensity of identified exposures would yield responses that could be used to characterize exposures in a semiquantified manner (eg, by grouping those exposed to more severe conditions, those exposed for longer periods, and/or those exposed more frequently). Although exposure variability is acknowledged as a potential key factor in exposure characterization (see Chapter 5, Future Improvement to Individual Exposure Characterization for Deployed Military Personnel), existing reviewed questionnaires have not addressed this variability.

Whereas several reviewing clinicians and researchers applauded the DARE questionnaire, they noted that an additional set of questions to collect standardized information regarding associated clinical and health-related questions was needed to help reduce the potential for diagnostic variability (see discussions in Chapter 5 [Future Improvements to Individual Exposure Characterization for Deployed Military Personnel] and Chapter 11 [Discussion Summary: Basic Diagnosis and Workup of Symptomatic Individuals]). Therefore, the USAPHC drafted the Clinical Evaluation of Respiratory Conditions (CERC) questionnaire. The CERC questionnaire focused on questions regarding symptoms, medical history, conditions, and health status. Although this initiative was focused on a clinical application, reviewers also provided input for use in research applications.[5]

Subsequent reviews of the DARE and CERC by DoD, VA, and academia clinicians, epidemiologists, public health experts, statisticians, questionnaire/survey developers, and those involved in a limited USAPHC military personnel beta test lead to the eventual composite set of questions provided in Appendix B.

WHY A QUESTIONNAIRE IS SO CRITICAL

The lack of detail regarding a service member's individual exposure experiences and personal risk factors has prevented studies from evaluating individual conditions that may result in higher risk of a chronic respiratory health outcome (see Chapter 5).[1-9] This was the original impetus for USAPHC's effort to create a standardized deployment exposure questionnaire. Reviewers of early versions of the questionnaires noted that these same data gaps were also problematic for clinical applications. The importance of a questionnaire for each application is summarized in the following section.

Public Health Research Needs

As discussed in Chapter 2 (Background of Deployment-Related Airborne Exposures of Interest and Use of Exposure Data in Environmental Epidemiology Studies) and Chapter 5, ambient environmental data has been of limited use to researchers who are trying to analyze the relationship between deployment exposures and individual pulmonary conditions. Instead, most research studies have used deployment status to southwest Asia as a proxy for exposure.[3,10] This assumes that all persons deployed to this area have had the same exposure experiences, ignoring the potentially significant differences in individuals' exposure experiences that can be affected by the individual's assigned tasks, activities, unique durations, frequencies, and intermittent peak exposures at specific locations at specific times. In addition, without confounding risk factor data from individuals (smoking status, aerobic physical fitness, and activities), research is not able to determine potential higher risk groups. Despite limitations and the lack of a standardized, official DoD- and VA-endorsed reference source of questions, questionnaires and survey tools continue to be used as a critical source of data in many, if not most, of the past studies and ongoing studies that are described in previous chapters of this book. With a library of approved questions, researchers could select questions most pertinent to study objectives. A standardized set of questions across services and the VA would help ensure more consistent and, thus, comparable data, improving transparency of future epidemiological studies and allowing for study comparisons.[3,4,10,11]

Clinical Applications

Upon return from deployment to southwest Asia, military personnel are required to complete a Post-Deployment Health Assessment (PDHA) and Post-Deployment Health Reassessment (PDHRA) (Tables A-1 and A-2).[12] These forms include

TABLE A-1

SUMMARY OF PUBLISHED MILITARY QUESTIONNAIRES REVIEWED

Questionnaire	Purpose
Pre-Deployment Health Assessment (DD Form 2795) Post-Deployment Health Assessment (DD Form 2796) Post-Deployment Health Reassessment (DD Form 2900)	Required forms for assessing state of health prior to determining medical deployability (PDHA-2795) and then status after deployment (PDHA-2796) within 30 days and then by 6 months (PDHRA). The form must be completed in an electronic or web-enabled form following service-specific directives and using one of the following service-specific data systems: Army MEDPROS, Air Force PIMR or AFCITA, or Navy/Marine Corps EDHA. (*Accessed December 2012 at http://fhp.osd.mil/pdhrainfo/sm_fam/sm_fam_Army.jsp*)
Depleted Uranium Questionnaire (DD Form 2872 test, February 2004) Health Survey (DD Form 2872-1 test, February 2004)	Required forms if patient indicates DU exposure on PDHA. Providers complete the DoD DU Questionnaire and Health Survey with the assistance of the patients being assessed for DU exposure. The DU form is used to obtain exposure information, and the health survey is a short measure of health-related functioning comprised of 36 questions asking the patient to describe physical or emotional problems over the past 4 weeks. (*Accessed December 4, 2012. Questionnaire at http://www.dtic.mil/whs/directives/infomgt/forms/eforms/dd2872t.pdf and survey at http://www.dtic.mil/whs/directives/infomgt/forms/eforms/dd2872t1.pdf. Other information at http://www.pdhealth.mil/downloads/OIF_DU_Med_Mgmt_Supp.pdf*)
Medical Record—Post-Deployment Medical Assessment (DD Form 2844 test, March 2002)	Established as a test form in response to Persian Gulf War deployment exposure concerns. Prescribed form used when evaluating patient with postdeployment health concerns when referred for care subsequent to screening using DD Form 2796 or when self-referred to facilitate outpatient treatment documentation by cueing patients and providers to note key aspects in the assessment, management, and treatment of patients with deployment-related health concerns. As a test form that has not been updated in more than 10 years, it is no longer considered an active form.
Asbestos Exposure Part 1 — Initial Medical Questionnaire (DD Form 2493-1, January 2000)	Borrows questions from the ATS Respiratory Disease Questionnaire. (*Accessed December 4, 2012 at http://www.dtic.mil/whs/directives/infomgt/forms/eforms/dd2493-1.pdf*)
Medical Examination Respirator Use Questionnaire (Example DA 470)	Questions focused on health status to be able to wear respiratory equipment without adverse health outcome. (*Blank form accessed December 4, 2012 at http://armypubs.army.mil/eforms/pdf/A4700.PDF*)
Persian Gulf Registry Code Sheet (VA Form 10-9009a(RS))	In 2002, the VA and DoD established the Persian Gulf Registry and the Clinical Comprehensive Evaluation Program for troops that deployed during Operation Desert Shield/Operation Desert Storm. The program is a now primarily the VA Gulf War Registry. This VA code sheet is similar to the questionnaire used by DoD. (*Accessed December 4, 2012 at http://www.gulflink.org/gwr/10-9009a.pdf. Related information at http://www.gulflink.org/gwr/registry.htm and http://www.publichealth.va.gov/exposures/gulfwar/registry_exam.asp*)
PTSD Check List–Military Version (PCL-M)	Self-administered questionnaire with 17 questions for assessing trauma-related stress. Three different versions are available. (*Accessed December 4, 2012 at http://www.pdhealth.mil/guidelines/appendix4.asp*)
Post-Deployment Clinical Assessment Tool (May 20, 2003)	Form consisting of an array of brief standardized illness-specific screens and assessments to assess and follow-up patients with postdeployment health concerns and illnesses. Measures patient status in the following areas: somatic symptoms; PTSD; depression; anxiety and panic; functional status; alcohol use; frequency of healthcare visits; social support; and satisfaction with healthcare. (*Accessed December 4, 2012 at http://www.pdhealth.mil/downloads/PDCAT_v7.pdf*)

(Table A-1 *continues)*

Table A-1 *continued*

MVP's Long-Form Survey Questionnaire	MVP is a national, voluntary research program of the VA Office of Research & Development. The goal of MVP is to partner with veterans in the VA Healthcare System to study how genes affect health. Data collected will be stored anonymously for research on diseases like diabetes and cancer, and military-related illnesses (ie, PTSD). (*Accessed December 4, 2012 at http://www.research.va.gov/MVP/*)

AFCITA: Air Force Complete Immunization Tracking Application; ATS: American Thoracic Society; DA: Department of the Army; DD: Department of Defense; DoD: US Department of Defense; DU: depleted uranium; EDHA: Electronic Deployment Health Assessment; MEDPROS: Medical Protection System; MVP: Million Veteran Program; PCL-M: PTSD Check List-Military; PDHA: Pre-Deployment Health Assessment/Post-Deployment Health Assessment; PDHRA: Post-Deployment Health Reassessment; PIMR: Preventive Health Assessment and Individual Medical Readiness; PTSD: posttraumatic stress disorder; VA: US Department of Veterans Affairs
Note: This is not a completely exhaustive list of all questionnaires found, but represents primary tools considered that have been implemented and are available for public viewing. (Many questionnaires cited in the study literature are not contained as part of the book and are not readily available.)

basic questions regarding overall and mental health status, symptoms, and a list of potential environmental deployment exposures. They are intended to be a screening tool for healthcare providers to identify potential postdeployment physiological and mental conditions. Providers are expected to ask patients appropriate follow-up exposure history questions. The DoD does provide for follow-up questionnaires to address concerns regarding depleted uranium (DU) exposures.[13] Yet, despite a growing number of patients who have postdeployment chronic respiratory conditions, there is no official required set of DoD or VA exposure history and medical/symptom questions for all clinicians to consistently use. This is problematic, especially because many patients with exposure concerns may be interacting with providers who are not specialists in environmental or occupational medicine. Data collected are inconsistent and may be inadequate, especially because most environmental and occupational diseases either manifest as common medical problems (eg, headache, rashes, asthma) or have nonspecific symptoms. Yet, consideration of environmental exposures does not often factor into most clinicians' history-taking or diagnosis.[14] As a result, clinicians may miss opportunities to make correct diagnoses or may fail to associate disease with past exposure. In an attempt to ensure that environmental exposures are adequately considered in the specialty cases they receive, the VA War Related Illness and Injury Study Centers have been developing a series of standardized questions that include several of those contained in this appendix. These questions, however, need to be vetted and incorporated more broadly across agencies and services. In addition, response data need to be collected in a retrievable electronic system. Currently, patient exposure history information, as documented in medical records, is not readily accessible for public health research applications.

Registry Needs

As discussed in Chapter 22 (Discussion Summary**:** Methodological Considerations to Design a Pulmonary Case Series and a National, Broad-based Registry for Veterans of Operation Iraqi Freedom and Operation Enduring Freedom), Chapter 25 (Toxic-Embedded Fragment Registry: Lessons Learned), and Chapter 26 (Lessons Learned From Self-Selected Registries [Agent Orange Registry]), the DoD and VA have established certain registries of past military exposure settings and incidents. The development and implementation of questionnaires are a critical component of registries (eg, the Gulf War Registry).[8] As future registries (eg, burn pit registry) may be established, the use of a questionnaire to collect individual information will likely be required. Although every operation and exposure incident may require some unique questions, the establishment of a consistent "library" of questions to draw on would facilitate implementation of registries and provide a better mechanism for use of responses in public health research applications.

EXISTING PRECEDENCE

Despite the recognized limitations of self-reported data from questionnaires (eg, recall and self-reporting bias),[9,11] there is substantial precedence for using such data to address gaps in "individual data." Tables A-1 and A-2 describe publically available questionnaires or tools that have been implemented by the military, other US or inter-

TABLE A-2

SUMMARY OF PUBLISHED UNITED STATES OR INTERNATIONALLY RECOGNIZED QUESTIONNAIRES AND SURVEYS REVIEWED

Questionnaire	Purpose
FOH Medical Surveillance Management Program—Health History and Physical Examination Form (FOH 5, Rev April 21, 2010)	Preoccupational assessment tool used by providers to document exposure and health history and determine duty fitness and respiratory fitness (for respirator use). (*Accessed December 4, 2012 at http://co.gloucester.nj.us/Pdf/Emergency/Medical%20Surveillance.pdf*)
ATS—Recommended Respiratory Disease Questionnaires for Use With Adults and Children in Epidemiological Research (ATS-DLD-78-A)	A critical internationally recognized instrument designed to support epidemiological research of respiratory diseases. Initially, a questionnaire was devised in the early 1950s in Great Britain after realization that the clinical assessment of subjects in epidemiological studies was plagued by uncontrollable biases. In 1969, the ATS published a version of its questionnaire in a document titled *Standards for Epidemiologic Surveys in Chronic Respiratory Disease*. A later version was expanded to address smoking history, family history, and occupational exposures history; this was endorsed by the MRC. The Division of Lung Diseases of the National Heart, Lung, and Blood Institute (which was funded by ATS) published the 1978 version that is still used today. Different groups have used the ATS Questionnaire, in part or in its entirety, to develop other surveys for various respiratory outcomes (eg, the European Community Respiratory Health Survey Questionnaire). (*Accessed December 4, 2012 and http://www.thoracic.org/statements/resources/archive/rrdquacer.pdf and www.ecrhs.org*)
IUATLD Bronchial Symptoms Questionnaire, 1984	The IUATLD Bronchial Symptoms Questionnaire was originally developed for use in studies of asthma. Its reliability has been evaluated and determined to be a useful tool for many applications (eg, distinguishing between bronchial asthma and chronic bronchitis) and for response to histamine. It has been a foundation for many other international respiratory questionnaires and protocols over the years, including that of the WHO. (*Accessed December 4, 2012 at http://site.theunion.org/download/asthma/Asthma_questionnaire.doc*)
OSHA 1910.1043 Subpart: Z, Toxic and Hazardous Substances; Cotton Dust; Appendix B Respiratory Questionnaire(s)	Appendix B-I: Respiratory Questionnaire. Appendix B-II: Respiratory Questionnaire for nontextile workers for the cotton industry. Appendix B-III: Abbreviated Respiratory Questionnaire. (*Accessed December 4, 2012 at http://www.osha.gov/pls/oshaweb/owasrch.search_form?p_doc_type=STANDARDS&p_toc_level=1&p_keyvalue=1910*)
USEPA BASE Indoor Air Quality Questionnaire (EPA 402-C-06-002, January 2006)	To provide baseline information from typical buildings to compare during "sick building" assessments, USEPA conducted the BASE study that covers three major areas: (1) environmental and comfort measurements; (2) building HVAC systems characterization; and (3) building occupant demographics, symptoms, and perceptions. (*Accessed December 4, 2012 at http://www.epa.gov/iaq/base/pdfs/2003_base_protocol.pdf[Appendix F]*)

(Table A-2 *continues)*

Table A-2 *continued*

NHANES III: NCHS Questionnaire(s) (asthma/respiratory conditions, smoking questionnaires)	The NHANES is a program of studies designed to assess the health and nutritional status of adults and children in the United States. The survey is unique in that it combines interviews and physical examinations. Interviews use several questionnaires for different topics. (*Accessed December 4, 2012. Guidance at http://www.cdc.gov/nchs/data/nhanes/nhanes3/cdrom/nchs/manuals/fieldint.pdf*) • *Asthma/respiratory questions at http://www.cdc.gov/asthma/survey/NHANES.pdf* • *Physical activity/fitness questions at http://www.cdc.gov/nchs/data/nhanes/nhanes_09_10/mi_paq_f.pdf* • *Smoking questions at http://www.cdc.gov/nchs/data/nhanes/nhanes_09_10/ai_smq_f.pdf*
California Flavoring Respiratory Questionnaire	This questionnaire helps healthcare providers monitor the health of workers in companies that manufacture food flavorings. It was developed to address concerns associated with bronchiolitis obliterans, a severe lung disease identified in workers who make microwave popcorn. (*Accessed December 4, 2012 at http://www.cdph.ca.gov/HealthInfo/discond/Pages/FlavoringLungDisease.aspx. Related information at www.dhs.ca.gov/ohb/flavorings.htm*)
IMCA	The IMCA is an international consensus product of clinicians and researchers in the field of respiratory diseases, representatives from international organizations (ie, WHO Europe), and scientific societies on a set of indicators to monitor COPD and asthma in all EU member states as part of an effort to build a "European system of information and knowledge concerning major chronic diseases." (*Accessed December 4, 2012 at http://www.imca.cat*)
Borg Perceived Exertion Scale	The CDC website describes use of the Perceived Exertion Scale. Original source: Borg, G. Perceived exertion as an indicator of somatic stress. *Scand J Rehabil Med*. 1970;2:92–98. (*Accessed December 4, 2012 at http://www.cdc.gov/physicalactivity/everyone/measuring/exertion.html*)
MRC Breathlessness Scale	Original source: Stenton C. The MRC breathlessness scale. *Occup Med (Lond)*. 2008;58:226–227.

ATS: American Thoracic Society; BASE: Building Assessment Survey and Evaluation; CDC: Centers for Disease Control and Prevention; COPD: chronic obstructive pulmonary disease; DLD: Division of Lung Disease; EU: European Union; FOH: Federal Occupational Health; HVAC: heating, ventilation, and air-conditioning; IMCA: indicators for monitoring COPD and asthma; IUATLD: International Union Against Tuberculosis and Lung Disease; MRC: Medical Research Council; NCHS: National Center for Health Statistics; NHANES: National Health and Nutrition Examination Survey; OSHA: Occupational Safety and Health Administration; Rev: revised; USEPA: US Environmental Protection Agency; WHO: World Health Organization

Note: This is not a completely exhaustive list of all questionnaires found, but represents primary tools considered that have been implemented and are available for public viewing. (Many questionnaires cited in the study literature are not contained as part of the book and are not readily available.)

national organizations, and/or research entities. Although most have not been definitively validated, some have been repeatedly studied and are considered to meet validation criteria in certain controlled occupational settings and populations.[15–23] Even though validation of tools used to help characterize military exposures may be impossible, the use of questions borrowed from well-established tools is considered a reasonable basis for precedent.

The military's use of questionnaires to address Gulf War assessment needs, as well as the detailed exposure and health history questionnaires of data for the DoD's DU Medical Surveillance Program, also indicate the feasibility of systematic self-reported data collection.[13,14,22] The program uses the PDHA/PDHRA as a screening tool to identify personnel needing to answer more detailed follow-up questions. This concept could be paralleled to address individuals with airborne exposure and respiratory health concerns. Specifically, those who identify health concerns in the PDHA electronic system could be flagged for a more detailed exposure and health questionnaire in the follow-up healthcare provider evaluation.

SUMMARY AND NEXT STEPS

Given other available options, and the many precedents for using questionnaires to collect self-reported exposure and relevant health status information, a standardized set of questions is considered a very viable solution to filling individual-level data gaps. Whereas the resulting set of questions are detailed and complex, they provide critical individual data that have not been available despite more than a decade of substantial and costly resources used to collect ambient environmental data. As previously noted, because the respiratory health outcomes of concern are not demonstrated in a larger population, attempts to minimize individual exposure and diagnostic variability are warranted. Despite concerns that use of such questions may be too difficult or time-consuming in research or clinical settings, a small internal beta test and lessons from other past examples, including the DoD DU program, suggest that administration of these questions is feasible in both research study and certain clinical applications. Of course, not all questions need to be used in all cases; the questions may be tiered or adjusted for specific applications and personnel. For example, clinical applications may not use the full set of questions unless a previously deployed patient presents with respiratory symptoms or a condition. Although specific implementation and use of such questions have not been determined, ideally an electronic system could be instituted to collect and archive responses in a database for broader public health use.

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